

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

Claim 1 (canceled)

2. (previously presented) An athermal optical element comprising a surface of a crystalline, cubic material with a surface figure of <200 nm, said material having an index of refraction,  $n$ , and a coefficient of expansion,  $\alpha$ , such that:

$$dn/dT = -n\alpha,$$

wherein  $T$  is temperature.

Claims 3-14 (canceled)

15. (previously presented) An athermal, optical composite material comprising a number of layers,  $m$ , at least two layers having different compositions and different values of  $dn/dT$ , wherein the total optical pathlength,  $nL$ , across all of said layers  $m$  is essentially independent of temperature; the optical parameters of said layers satisfying the equation

$$\sum_{i=1}^m L_i (dn_i/dT + n_i \alpha_i) = 0$$

where  $m$  is the number of layers,  $L_i$  is the [total] thickness of the  $i^{\text{th}}$  layer in the direction of optical use,  $n_i$  and  $\alpha_i$  are the refractive index and thermal expansion of the material making up the  $i^{\text{th}}$  layer

and  $dn_i/dT$  is the variation of refractive index of the material making up the  $i^{\text{th}}$  layer with temperature  $T$ , and at least two of said values of  $dn/dT$  have opposite signs.

16. (original) A composite material of claim 15 wherein each of said layers comprises a glass composition, a crystalline material or a polymeric material.

17. (original) A composite material of claim 15 wherein said layers are glass/crystalline, glass/polymeric or polymeric/crystalline composites.

18. (original) A composite material of claim 17 having a surface with a surface figure of  $<200$  nm.

Claims 19-29 (canceled)

30. (original) An athermal, optical composite material comprising at least two layers of different compositions, wherein the total optical pathlength,  $nL$ , across said two layers is essentially independent of temperature; and wherein  $n$  is index of refraction,  $L$  is the total thickness of the layers, and  $T$  is temperature.

31. (original) A composite material of claim 30 wherein each of said layers comprises a glass composition, a crystalline material or a polymeric material.

32. (original) A composite material of claim 30 wherein said layers are glass/crystalline, glass/polymeric or polymeric/crystalline composites.

33. (original) A composite material of claim 32 having a surface with a surface figure of <200 nm.

Claim 34 (canceled)

35. (currently amended) An optical element of claim 1 ~~2~~ wherein said surface is sufficiently large to function as a demultiplexer.

36. (currently amended) An optical element of claim 1 ~~2~~ wherein said surface is exposable to air.